NATIONAL HIGH MAGNETIC FIELD LABORATORY - PULSED FIELD FACILITY

Probing and characterizing the thermodynamic properties of new materials to understand their behavior and discover new states of matter

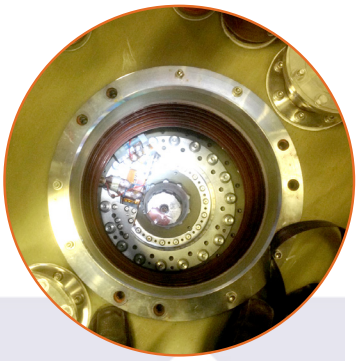
Home of the world's first nondestructive magnet to exceed 100 T, the National High Magnetic Field Laboratory-Pulsed Field Facility (NHMFL-PFF) at Los Alamos National Laboratory specializes in materials science at the highest possible magnetic field intensity.

USER PROGRAM

The Pulsed Field Facility is part of the National High Magnetic Field Laboratory user program, allowing researchers access to a wide variety of experimental capabilities in pulsed magnetic fields and collaboration with some of the world's leading experts in high field condensed matter physics and pulsed magnet science. The NHMFL-PFF is open to all scientists via a competitive proposal process.

HIGH FIELD CAPABILITIES

Non-destructive magnets – Short duration magnetic fields are necessary to overcome runaway heating of the magnet solenoid at high current and to minimize the duration of materials stress due to the magnetic forces.



Short pulse magnets (capacitor driven)

- **Field strength:** 65 T, 10 ms rise time, 100 ms duration (15 mm, 75 K bore; 8 mm, 0.5 K sample space)
- **Field strength:** 72 T, 10 ms rise time, 100 ms duration (7 mm, 75 K bore; 3 mm, 0.5 K sample space)

Long pulse magnet (generator driven) *(adjustable pulse shape)*

- **Field strength:** up to 60 T, 3 sec duration with up to 100 ms full field flat top, (25 mm 75 K bore; 18 mm 0.5 K sample space)

100 T magnet (generator and capacitor driven)

- **Field strength:** up to 100 T, 3 sec duration, 8 ms rise time from 40-100 T, (10 mm, 75 K bore; 5 mm 0.5 K sample space)

Destructive and semi-destructive magnets – Since the intense magnetic field exists only as long as it takes a shockwave to propagate through the magnet, the pulse duration is limited to a few microseconds. The highest magnetic fields are achieved by explosively compressing the magnetic field into the sample.

Single turn magnet system (capacitor driven) *(Samples typically are undamaged during measurements in this system.)*

- **Field strength:** 100-250 T, 2.2 μs rise time 5 μs duration (10 mm room temperature bore; 5 mm 2 K sample space)

Flux compression strip generator (chemical and capacitor driven)

- **Field strength:** 100-250 T, 5-10 μs rise time (available at Los Alamos through collaboration and external funding)

MEASUREMENT TECHNIQUES

Extraction magnetometry • Susceptibility • Torque magnetometry • Magnetotransport (DC-AC-rf) • Contactless conductivity • Dielectric measurements • Microwave frequency, cyclotron, and electron paramagnetic resonance • FIR/THz spectroscopy • Ultrafast optical spectroscopy • UV/visible/NIR optical spectroscopy • Resonant ultrasound and pulse-echo spectroscopy • Capacitive dilatometry • Fiber Bragg dilatometry • Heat capacity • High current and Jc • High pressure

nhmfl.lanl.gov **(505) 667-5032**

MATERIALS PHYSICS AND APPLICATIONS

Cultivating cutting-edge science through national user facilities

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